

REMARKS

In the Claims:

Claims 1, 3-14, 16-20, and 28-34 remain in this application. Claims 2, 15, 21-27 and 35-38 have been canceled.

Rejections Under 35 U.S.C. 103(a):

Claims 1, 5-8, and 9-33 were rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al. (US 6,211,061) (hereinafter “Chen”) in view of Fink et al. (“Standard Handbook for Electrical Engr.” McGraw-Hill, New York (1968)) (hereinafter “Fink”).

Chen and Fink fail to disclose or suggest a diffusion barrier layer on a substrate, an etch stop layer on the diffusion barrier layer, and an ILD layer on the etch stop layer as recited in **claims 1, 9, and 16**. The Examiner has mischaracterized the dielectric layer (30) of Chen as an etch stop layer. An etch stop layer is not merely defined by its composition, but rather its ability to stop an etch of another layer by virtue of its etch selectivity to the other layer (Detailed Description of the present invention page 7, lines 12-13, page 10, lines 21-22). Because a selected etch process will etch the etch stop layer at a **lesser** rate than the layer above it, the etch stop layer is typically used to stop an etch process used to etch a layer above the etch stop layer from affecting the layer below the etch stop layer.

The dielectric layer (30) in Chen is not an etch stop layer. In contrast, it is the opposite of an etch stop layer: it is etched at a **greater** rate than the layer above it (the hard mask layer (34)). Chen uses a hard mask layer (34) when patterning dielectric layer (30) (Chen, col. 6, lines 17-19; Fig. 4). Such hard mask layer-assisted patterning methods use the hard mask layer to protect the underlying patterned layer from the etchant, and the hard mask

layer material is chosen to be etched at a **lower** rate than the layer below (thus, the layer below is etched at a greater rate than the hard mask layer). Thus, because the hard mask layer (34) above the dielectric layer (30) arrangement of Chen is the opposite of the ILD layer above an etch stop layer of claim 1, Chen fails to disclose or suggest an ILD layer above an etch stop layer as recited in claim 1.

Because claims 1, , 9 and 16 are nonobvious as discussed above, claims 3-8, 10, 12-14, 17-20 and 28-34 are also nonobvious. If an independent claim is nonobvious, then any claim depending from the independent claim is also nonobvious. In re Fine, 5 USPQ2d 1596 (Fed. Cir. 1998). Claims 3-8 and 28-34 depend from claim 1, claims 10 and 12-14 depend from claim 9, and claims 17-20 depend from claim 16.

Chen fails to disclose a single-damascene contact as recited in **claim 8**. Because the Examiner has incorrectly applied In re Dailey and MPEP section (IVB), the rejection of claim 8 is improper and should be withdrawn. MPEP 2144.04 states that, “if the facts in a prior legal decision are sufficiently similar to those in an application under examination, the examiner may use the rationale used by the court,” and that, “If the applicant has demonstrated the criticality of a specific limitation, it would not be appropriate to rely solely upon case law as the rationale to support an obviousness rejection.” MPEP 2144.04(IVB) is then listed as an examples of court cases in which the court has ruled that the variations between a claim and prior art would be within the ordinary skill in the art. The example fact patterns in MPEP 2144.04(IVB) are not similar to the differences between claim 8 and Chen, so MPEP 2144.04(IVB) is not applicable.

MPEP 2144.04(IVB) is not applicable to the situation at hand. MPEP 2144.04(IVB) is applicable when the difference is a difference in shape. The difference in shape must not be significant. In re Dailey, 357 F.2d 669, 149 USPQ 47 (CCPA 1966). The difference

between single-damascene and dual-damascene structures are not merely a difference in “shape.” They are two different types of structures. Chen is concerned with problems involved with making dual-damascene structures. As described in Chen, there are multiple problems faced in dual-damascene structures (see Chen’s description of three prior art, problematic processes at: col. 4, lines 3-49 and Figs. 1A and 1B; col. 4, line 50 through col. 5, line 18 and Figs. 2A, 2B, and 2C; and col. 5, lines 19-48 and Fig. 3). Figures 4 through 7 of Chen illustrate a method to overcome those problems (Chen, col. 5, lines 51-53), and use the hard mask layer (34), dielectric layer (30) and barrier layer (24) to do so. The Examiner has cited no evidence that the same layers and processes useful in overcoming problems in the dual-damascene structures described in Chen would also be used to form single-damascene structures. Applicants can only assume that the Examiner is taking Official Notice of this, and request that the Examiner either cite a reference supporting the Examiner’s position, or withdraw the rejection.

Chen fails to disclose or suggest a structure with an ILD layer thickness at least five times as that of a second layer, and an effective dielectric constant of less than about 3, as recited in **claims 30, 33, and 34**. As stated by the Examiner in the rejection of claim 1, layer (34) of Chen has a dielectric constant of 3.9, layer (30) of Chen has a dielectric constant of less than 3.0, and layer (24) of Chen has a dielectric constant of over 7. If layer (34) of Chen were at least five times as thick as layer (30), the dielectric constant of layer (30) would have to be under 1.5 for the effective dielectric constant of the structure to be under about 3. Chen fails to disclose or suggest a layer (30) with a dielectric constant of under 1.5. Thus, even if one of skill in the art, armed with the knowledge of Chen, would be motivated to make the ILD layer at least five times as thick as the etch stop layer (and Applicants dispute this), the resulting structure would have an effective dielectric constant above 3.

Because one of skill in the art would not combine Chen and Uglow as suggested by the Examiner, the rejection of **claim 28** should be withdrawn. A prima facie rejection under 35 U.S.C. 103(a) requires a suggestion or motivation within the cited prior art or within the knowledge generally available to one of ordinary skill in the art to combine references or modify a reference (MPEP 706.02(j), 2143; *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991)). The Examiner states that it would have been obvious to combine Chen and Uglow to, “obtain a damascene structure to interconnect various parts of the circuit.” However, Chen alone already discloses forming a dual damascene structure in the ILD layer (30) (see Chen, col. 7, lines 11-18). Therefore, one of skill in the art would not be motivated to look to Uglow to form such a structure.

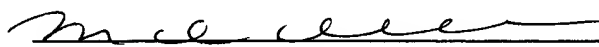
Further, one of skill in the art would not replace the hard mask layer (34) of Chen with the ILD layer 106' of Uglow. Hard mask layer (34) of Chen is used to form a patterned trench in the ILD layer (30) of Chen (see Chen Figure 4; col. 6, lines 17-22). This trench forms part of a multi-width trench (see Chen, Figure 7) in which the dual damascene connection is formed. One of skill in the art would not replace this hard mask layer (34) of Chen, with the ILD layer 106' of Uglow because the ILD layer 106' of Uglow would not provide the same patterning functionality as the hard mask layer (34) of Chen. Additionally, forming a multi-width trench in a hard mask layer would serve no purpose and necessitate multiple process steps, so one of skill in the art would not do this.

Pursuant to 37 C.F.R. 1.136(a)(3), applicant(s) hereby request and authorize the U.S. Patent and Trademark Office to (1) treat any concurrent or future reply that requires a petition for extension of time as incorporating a petition for extension of time for the appropriate length of time and (2) charge all required fees, including extension of time fees and fees under 37 C.F.R. 1.16 and 1.17, to Deposit Account No. 02-2666.

Respectfully submitted,

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